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Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **ME354U - Numerical Analysis And Computational Methods**

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Maximum Marks : **60**   Duration : **3 Hrs**

[Edit] [Print] [View Answer Key] [Close]   **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. *All questions are compulsory.*
2. *Illustrate your answer with suitable figures/sketches wherever necessary.*
3. *Assume suitable additional data; if required.*
4. *Use of logarithmic table, drawing instruments and non programmable calculators is allowed.*
5. *Figures to the right indicate full marks.*

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1)   Solve Any Three   [18]

a) 1)Explain Mathematical Modelling   2)Types of errors   [6]

b) Determine the positive root of the equation $x^3 - x = 1$ by bisection method   [6]

c) Find root of equation $4x - e^x = 0$ that lies between 2 and 3 using Newton-Raphson method   [6]

d) Using Taylor's series method, find correct to four decimal places, the values of y (0.1),   given $dy/dx = x^2 + y^2$ and y (0) = 1.   [6]

2)   Solve Any Three   [18]

a) 1) State trapezoidal rule   2) State Simpson's 1/3 rule   [6]

b) Given $dy/dx = x + y$ with initial condition y(0) = 1, x=(0.0),(0.2) (1.0) using Euler's method.   [6]

c) Determine value of y for x = 7.5 and x = 10 from the following data :   [6]

x	3	4	5	6	7
y	1.59	2.76	3.195	2.73	1.988

Using Lagrange's interpolation formula,

d) *From the tabulated values of x and y given below, prepare forward difference table. Estimate value of y when   x = 3.*   [6]

x	2	4	6	8	10
y	30	43	64	87	104

3)   Solve Any Three   [18]

a)   1. State Newton's divided difference interpolation formula.   2) State Lagrange's interpolation formula   [6]

b) Solve following equations for five iterations using Gauss-Seidel method,   [6]

$$4x_1 + 2x_3 = 4$$
$$5x_2 + 2x_3 = 3$$
$$5x_1 + 4x_2 + 10x_3 = 2$$

c)   [6]

Solve the equations

$2x + y + 4z = 12$

$8x – 3y + 2z = 20$

$4x + 11y – z = 33$

by Gauss elimination method.

d) What is the Finite Difference method? Describe its Advantages and Disadvantage.   [6]

4)   Answer the following question   [6]

a) What is the Finite Element Method & explain the various steps involved in the analysis by Finite Element Method?   [6]

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